

Carolinas Coastal Ocean Observing and Prediction System (Caro-COOPS)

Region: Southeast, North Carolina, South Carolina

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Brief Project Summary

The Carolinas Coastal Ocean Observing and Prediction System (Caro-COOPS) is a wholly integrated system for coastal observations and their application to user-driven needs. It includes 1) an extensive array of instrumented moored buoys and coastal stations off the Carolinas, collecting data related to coastal zone physical and ecological phenomena and conditions; 2) a comprehensive data assessment and management system, essential for aggregation, organization, standardization, visualization, and dissemination of high-quality, real-time data and information; 3) an advanced suite of integrated models that will markedly improve the predictive capacities of real-time physical data from coastal zone instrumentation; and 4) mechanisms to transfer new operational tools to National Weather Service (NWS) Weather Forecast Office staff members, emergency managers, and others. The central goal of Caro-COOPS, a partnership among the University of South Carolina, North Carolina State University, and the University of North Carolina at Wilmington (UNCW), is prediction of coastal ocean processes.



This project is contributing to the Integrated Ocean Observing System (IOOS) by

- Developing storm surge modeling products
- Providing real-time ocean observing data to meet regional needs
- Supporting the national backbone by making ocean observing data available through the National Oceanic and Atmospheric Administration (NOAA).

Key Accomplishments

Storm Surge Modeling

- The Caro-COOPS team works directly with South Carolina Emergency Management Division staff members to provide storm surge forecasts during storm events. In the event of an approaching hurricane, storm surge forecasts are generated based on updated hurricane track forecasts issued by the National Hurricane Center. The data management group transforms the forecasts into useful information products, which include storm surge “probability of inundation” maps, and static and animated geographic information system (GIS) shapefile layers of flooding and drying depths associated with storm surge.
- Caro-COOPS forecast model output was used to develop a demonstration version of an interactive flooding risk assessment system (StormMap). New model products include an initial prototype catalogue of flooding scenarios that will provide information well in advance of storm landfall. The package of scenarios represents predicted flooding levels for a suite of potential storm conditions, including storm category and size, point and angle of landfall, and speed. For 2006 hurricanes, there is a catalog of 1872 storm surge scenarios for select areas along the coast of the Carolinas. Model output is provided to NWS Weather Forecast Office staff members and emergency managers via a Web portal in three selectable forms: GIS maps, animation of flooding progression, and portable document format (PDF), illustrating flooding at specific times after and during landfall, allowing them to examine flooding predictions for specific scenarios.

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Real-Time Observation Network

- Caro-COOPS has established a real-time observational network consisting of shore-based water level / meteorological stations (WLS) and offshore moored buoys in three cross-isobath lines from the shore to the mid-shelf (30 meters) off the coast of the Carolinas. The system provides freely available oceanographic and meteorological observation data in real time for a variety of data and information applications. Surface-level wind data from the Capers Island WLS station (no. 86598971) was used by the National Hurricane Center to reclassify Tropical Storm Gaston to a category 1 hurricane at landfall on the coast of Bulls Bay, South Carolina, on August 29, 2004.

Supporting the National Backbone

- Caro-COOPS systems are providing near-real-time data on core IOOS oceanographic variables, including vector current profiles, wave direction, wave energy spectra, water level, sea surface and bottom temperatures and salinities, surface fluorescence, and meteorological variables, including air temperature, wind speed, direction, gusts, barometric pressure, relative humidity, and solar radiation. Data from the three coastal water level and meteorological stations are incorporated in the NOAA Center for Operational Oceanographic Products and Services' National Water Level Observing Network. Caro-COOPS buoy data are sent to the National Data Buoy Center, and a formal memorandum is now in place to archive Caro-COOPS data at the National Oceanographic Data Center.

Carolinas Coast

- Caro-COOPS has partnered with UNCW's Coastal Ocean Research and Monitoring Program (CORMP) and the NWS Weather Forecast Office in Wilmington, North Carolina, to develop a comprehensive Web site for marine-related conditions and forecasts in the Carolinas. Development of the initial phase of the "Carolinas Coast" project (<http://carocoop.org/carolinas/>) was completed with input from the Southeast Coastal Ocean Observing Regional Association and user feedback efforts from CORMP and NWS. Carolinas Coast presents a simpler, more "user friendly" map version of Carolinas in-situ and remotely sensed information, leveraging off the data aggregations and calling methods available from the Southeast Atlantic Coastal Ocean Observing System database. This Web site will replace the Wilmington Weather Forecast Office's existing marine Web page, and has generated interest from other Weather Forecast Offices throughout the Southeast region.

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